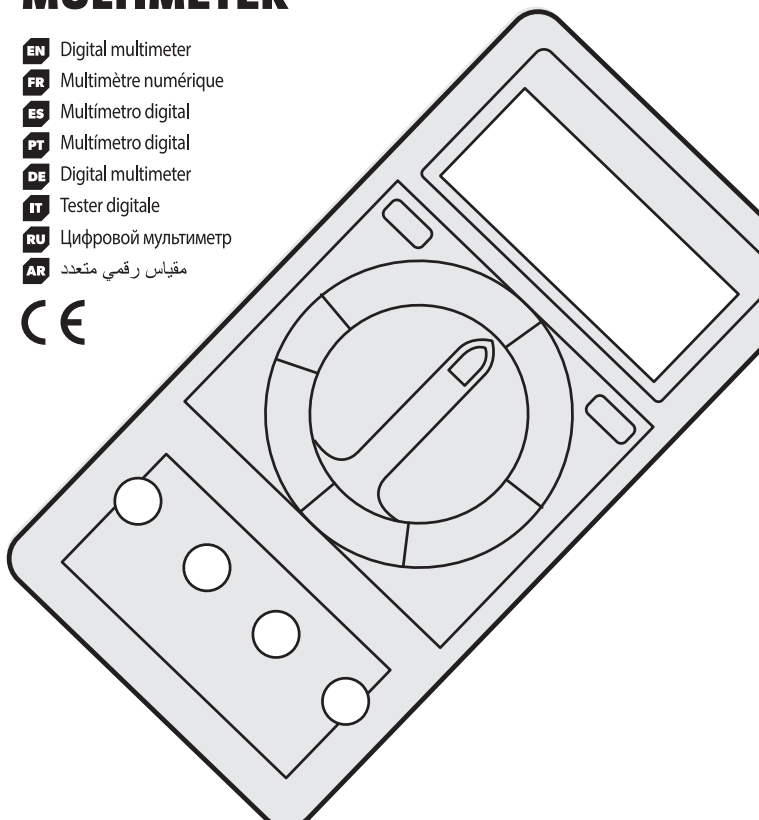


# TOLSEN

## 38031

### DIGITAL MULTIMETER

- EN** Digital multimeter
- FR** Multimètre numérique
- ES** Multímetro digital
- PT** Multímetro digital
- DE** Digital multimeter
- IT** Tester digitale
- RU** Цифровой мультиметр
- AR** مقاييس رقمي متعدد





## WARRANTY

This instrument is warranted to be free from defects in material and workmanship for a period of one year. Any instrument found defective within one year from the delivery date and returned to the factory with transportation charges prepaid, will be repaired, adjusted, or replaced at no charge to the original purchaser. This warranty does not cover expandable items such as battery or fuse. If the defect has been caused by a misuse or abnormal operating conditions, the repair will be billed at a nominal cost.

## SAFETY INFORMATION

This meter has been designed according to IEC 61010 concerning electronic measuring instruments with a measurement category (CAT III 300V) and pollution degree 2.

### **Warning**

To avoid possible electric shock or personal injury, follow these guidelines:


- Do not use the meter if it is damaged. Before you use the meter, inspect the case. Pay particular attention to the insulation surrounding the connectors.



- Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads before you use the meter.
- Do not use the meter if it operates abnormally. Protection may be impaired. When in doubt, have the meter serviced.
- Do not operate the meter where explosive gas, vapor, or dust is present.
- Do not apply more than the rated voltage, as marked on the meter, between terminals or between any terminal and earth ground.
- Before use, verify the meter's operation by measuring a known voltage.
- When measuring current, turn off circuit power before connecting the meter in the circuit. Remember to place the meter in series with the circuit.
- When servicing the meter, use only specified replacement parts.
- Use caution when working with voltage above 30V ac rms, 42V peak, or 60V dc. Such voltages pose a shock hazard.
- When using the probes, keep your fingers behind the finger guards on the probes.
- When making connections, connect the common test lead before you connect the live test lead. When you



disconnect test leads, disconnect the live test lead first.

- Remove the test leads from the meter before you open the back cover or the case.
- Do not operate the meter with the back cover or portion of the case removed or loosened.
- To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the low battery indicator (  ) appears.
- Do not use the meter in a manner not specified by this manual or the safety features provided by the meter may be impaired.
- Adhere to local and national safety codes. Individual protective equipment must be used to prevent shock and arc blast injury where hazardous live conductors are exposed.
- To avoid electric shock, do not touch any naked conductor with hand or skin, and do not ground yourself.
- Don't use the supplied test leads with other equipment.
- Do not use the meter if the meter, a test lead or your hand is wet.
- When an input terminal is connected to dangerous live potential, it is to be noted that this potential can occur at all other terminals!
- **CAT III** - Measurement Category III is for measurements performed in the building installation. Examples are



measurements on distribution boards, circuit breakers, wiring, including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation, and equipment for industrial use and some other equipment, for example, stationary motors with permanent connection to the fixed installation.

Do not use the meter for measurements within Measurement Categories IV.

## Caution

To avoid possible damage to the meter or to the equipment under test, follow these guidelines:

- Disconnect circuit power and discharge all capacitors thoroughly before measuring resistance, diode and continuity.
- Use the proper terminals, function and range for your measurements.
- Before measuring current, check the meter's fuses.
- Before turning the rotary switch to change functions, disconnect test leads from the circuit under test.



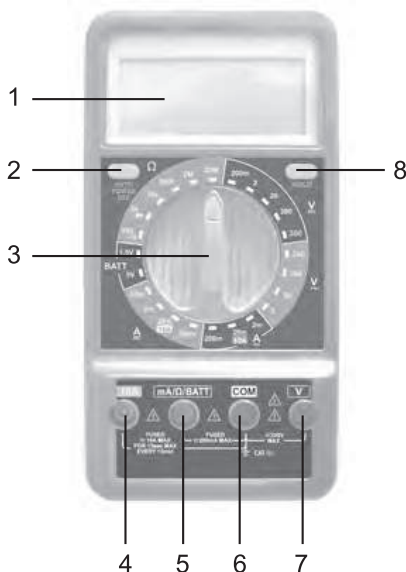
## Symbols

- ~ Alternating Current
- ≡ Direct Current
- ⎓ Both direct and alternating current
- ⚠ Caution, risk of danger, refer to the operating manual before use.
- ⚡ Caution, risk of electric shock.
- ⏏ Earth (ground) Terminal
- ⏏ Fuse
- CE Conforms to European Union directives
- The equipment is protected throughout by double insulation or reinforced insulation.

## INTRODUCTION

This meter is a compact 3 1/2 digits digital multimeter for measuring DC and AC voltage, DC and AC current, resistance, diode, battery and continuity. It features polarity indication, data hold, overrange indication, overload protection, automatic power-off, and etc. It is easy to operate and is an ideal test tool.

## FRONT PANEL



### 1. Display

3 1/2-digit LCD

### 2. Power Switch

Press this power switch to turn on or off the meter.

### 3. Function/Range Switch

Used to select the desired function or range.



#### **4. " 10A " Terminal**

Plug-in connector for the red test lead for current ( 200mA - 10A ) measurements.

#### **5. " mA/ $\Omega$ /BATT " Terminal**

Plug-in connector for the red test lead for all measurements except voltage measurements and current measurements between 200mA and 10A.

#### **6. " COM " Terminal**

Plug-in connector for the black test lead for all measurements.

#### **7. " V " Terminal**

Plug-in connector for the red test lead for voltage measurements.

#### **8. " HOLD " Button**

Used to enter/exit Data Hold mode.





## GENERAL SPECIFICATION

**Display:** 3 1/2 digits LCD, with a max. reading of 1999

**Negative Polarity Indication:** Negative sign "-" shown  
on the display automatically

**Sampling Rate:** About 2 to 3 times/sec

**Low Battery Indication:** "  " shown on the display

**Battery:** 9V battery, 6F22 or equivalent, 1 piece

**IP Degree:** IP20

**Operating Environment:** Temperature: 0°C to 40°C,  
Relative Humidity: < 75%

**Storage Environment:** Temperature: -10°C to 50°C  
Relative Humidity: < 85%

**Operating Altitude:** 0 - 2000 meters

**Size:** 164 × 85 × 35 mm

**Weight:** About 233g ( including battery )

## SPECIFICATIONS

Accuracy is specified for a period of one year after calibration and at 18°C to 28°C, with relative humidity < 75%.

Accuracy specifications take the form of:

**± ([% of Reading] + [number of Least Significant Digits])**



## DC Voltage

Range	Resolution	Accuracy	Overrange Indication
200mV	0.1mV	$\pm (0.5\% + 5)$	" OL " shown on the display
2V	1mV	$\pm (0.8\% + 5)$	
20V	10mV		
200V	0.1V		
300V	1V	$\pm (1.0\% + 5)$	

**Input Impedance:** 10M $\Omega$

**Overload Protection:** 300V DC/AC rms

## AC Voltage

Range	Resolution	Accuracy	Overrange Indication
2V	1mV	$\pm (1.0\% + 5)$	" OL " shown on the display
20V	10mV		
200V	0.1V		
300V	1V	$\pm (1.2\% + 5)$	

**Input Impedance:** 10M $\Omega$

**Frequency Range:** 40Hz to 400Hz

**Overload Protection:** 300V DC/AC rms

**Response:** Average, calibrated in rms of sine wave



## DC Current

Range	Resolution	Accuracy	Overrange Indication
200μA	0.1μA	± (1.0% + 5)	" OL " shown on the display
2mA	1μA		
20mA	10μA	± (1.2% + 5)	
200mA	0.1mA		
10A	10mA	± (2.0% + 5)	—— [1]

### Overload Protection:

250mA / 300V Fast fuse ( for protection for " mA/ $\Omega$ /BATT " terminal inputs )

10A / 300V Fast fuse ( for protection for " **10A** " terminal inputs )

**Max. Input Current:** 10A ( For inputs > 2A: measurement duration < 15 secs, and interval > 15 minutes )

[1] If the current being measured is > 10A, the display may show the value of the current; but the measurement is dangerous.

## AC Current

Range	Resolution	Accuracy	Overrange Indication
2mA	1μA	± (1.2% + 5)	" OL " shown on the display
20mA	10μA	± (1.5% + 5)	
200mA	0.1mA		
10A	10mA	± (3.0% + 7)	—— [1]

**Overload Protection:**

250mA / 300V Fast fuse ( for protection for " mA/ $\Omega$ /BATT " terminal inputs )

10A / 300V Fast fuse ( for protection for " **10A** " terminal inputs )

**Max. Input Current:** 10A ( For inputs > 2A: measurement duration < 15 secs, and interval > 15 minutes )

**Frequency Range:** 40Hz to 400Hz

**Response:** Average, calibrated in rms of sine wave

- [1] If the current being measured is > 10A, the display may show the value of the current; but the measurement is dangerous.

## Resistance



Range	Resolution	Accuracy	Overrange Indication
200Ω	0.1Ω	± (1.0% + 5)	" OL " shown on the display
2kΩ	1Ω	± (0.8% + 3)	
20kΩ	10Ω		
200kΩ	0.1kΩ		
2MΩ	1kΩ		
20MΩ	10kΩ	± (1.2% + 3)	

**Overload Protection:** 300V DC/AC rms

## Battery Test

Range	Description	Test Condition
1.5V	The working voltage of the battery under test is shown on the display, so the battery's quality can be judged.	Working Current: about 20mA.
9V		Working Current: about 5mA.

## Diode and Continuity Test

Range	Description	Test Condition
	The approximate forward voltage drop of the diode will be displayed.	Open Circuit Voltage: about 2.9V Test Current: about 1mA
	<p>The built-in buzzer will sound if the resistance is less than about 20Ω.</p> <p>The buzzer may or may not sound if the resistance is between 20Ω and 150Ω.</p> <p>The buzzer will not sound if the resistance is more than about 150Ω.</p>	Open Circuit Voltage: about 2.3V



## OPERATING INSTRUCTION

### Data Hold mode

Press the " **HOLD** " button to enter Data Hold mode, the present reading will be held on the display. To exit Data Hold mode, press this button again.

#### Note:

If you turn the range switch to other position when the meter is in Data Hold mode, the meter will not exit Data Hold mode ( but the position of the decimal point may change ). In this condition, you can press the " **HOLD** " button to exit Data Hold mode.

### Measuring DC Voltage

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **V** " terminal.
2. Set the range switch in desired  $\underline{\text{V}}$  range position.  
If the magnitude of the voltage to be measured is not known beforehand, set the range switch in the highest range position first and then reduce it range by range until satisfactory resolution is obtained.
3. Connect the test leads across the source or circuit to



be tested.

4. Read the reading on the display. The polarity of the red test lead connection will be indicated as well.

**Note:**

To avoid electric shock to you or damages to the meter, do not apply a voltage higher than 300V between the terminals.

## Measuring AC Voltage

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **V** " terminal.
2. Set the range switch in desired  $\sqrt{\phantom{x}}$  range position.  
If the magnitude of the voltage to be measured is not known beforehand, set the range switch in the highest range position first and then reduce it range by range until satisfactory resolution is obtained.
3. Connect the test leads across the source or circuit to be tested.
4. Read the reading on the display.

**Note:**

To avoid electric shock to you or damages to the meter, do not apply a voltage higher than 300V between the terminals.



## Measuring DC Current

1. Connect the black test lead to the " **COM** " terminal.  
Connect the red test lead to the " **mA/Ω/BATT** " terminal if the current to be measured is less than 200mA. If the current is between 200mA and 10A, connect the red test lead to the " **10A** " terminal instead.
2. Set the range switch in desired **A** range position.
3. Turn off power to the circuit to be tested. Then discharge all capacitors.
4. Break the circuit path to be tested, then connect the test leads in series with the circuit.
5. Turn on power to the circuit, and read the reading on the display. The polarity of the red test lead connection will be indicated as well.

### **Note:**

If the magnitude of the current to be measured is not known beforehand, set the range switch in the highest range position first and then reduce it range by range until satisfactory resolution is obtained.

## Measuring AC Current

1. Connect the black test lead to the " **COM** " terminal.





Connect the red test lead to the " **mA/Ω/BATT** " terminal if the current to be measured is less than 200mA. If the current is between 200mA and 10A, connect the red test lead to the " **10A** " terminal instead.

2. Set the range switch in desired **A** range position.
3. Turn off power to the circuit to be tested. Then discharge **all** capacitors.
4. Break the circuit path to be tested, then connect the test leads in series with the circuit.
5. Turn on power to the circuit, and read the reading on the display.

### **Note:**

If the magnitude of the current to be measured is not known beforehand, set the range switch in the highest range position first and then reduce it range by range until satisfactory resolution is obtained.

## **Measuring Resistance**

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **mA/Ω/BATT** " terminal.
2. Set the range switch in desired **Ω** range position.
3. Connect the test leads across the object to be tested.
4. Read the reading on the display.

**Note:**

1. For measurements  $> 1\text{M}\Omega$ , the meter may take a few seconds to stabilize reading. This is normal for high resistance measurements.
2. When the input is not connected, i.e. at open circuit, " OL " will be shown on the display as an overrange indication.
3. Before measurement, disconnect all power to the circuit to be tested and discharged all capacitors thoroughly.

## Continuity Test

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **mA/ $\Omega$ /BATT** " terminal.
2. Set the range switch in the **•)))** position.
3. Connect the test leads across the circuit to be tested.
4. If the resistance is less than about  $20\Omega$ , the built-in buzzer will sound.

**Note:**

Before test, disconnect all power to the circuit to be tested and discharged all capacitors thoroughly.



## Diode Test

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **mA/Ω/BATT** " terminal.  
(**Note:** The polarity of the red test lead is positive " + ".)
2. Set the range switch in the **➡+** position.
3. Connect the red test lead to the anode of the diode to be tested and the black test lead to the cathode of the diode.
4. The display shows the approximate forward voltage drop of the diode. If the connection is reversed, " **OL** " will be shown on the display.

## Battery Test

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **mA/Ω/BATT** " terminal.
2. According to the rated voltage of the battery to be tested, set the range switch in the corresponding **BATT** range position.
3. Connect the test leads to the two terminals of the battery to be tested.
4. Read the working voltage of the battery on the display.



## **Auto Power Off**

If you have not operated the meter for about 15 minutes, the meter will turn off automatically. To turn on the meter again, press the power switch twice.

## **MAINTENANCE**

### **Warning**

Except replacing fuse and battery, never attempt to repair or service the meter unless you are qualified to do so and have the relevant calibration, performance test, and service instructions.

Store the meter in a dry place when not in use. Don't store it in an environment with intense electromagnetic field.

### **General Maintenance**

Periodically wipe the case with a damp cloth and a little mild detergent. Do not use abrasives or solvents.

Dirt or moisture in the terminals can affect readings.

Clean the terminals as follows:




1. Turn off the meter and remove all the test leads from the meter.
2. Shake out any dirt which may exist in the terminals.
3. Soak a new swab with alcohol.
4. Work the swab around in each terminal.

If the meter fails, check the battery and fuses, and/or review this manual to verify correct operation.

## Replacing Battery and Fuse

### Warning

To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the low battery indicator (  ) appears.

To prevent damage or injury, install only replacement fuses specified.

Turn off the meter and remove the test leads before opening the back cover or the case.

To replace the battery, remove the screws on the back cover and remove the back cover. Replace the exhausted battery with a new one of the same type ( 9V battery, 6F22 or equivalent ). Reinstall the back cover and the screws.



To replace fuse, remove the screws on the back cover and remove the back cover. Replace the blown fuse with a new one of the same ratings. Reinstall the back cover and the screws.

**The meter uses two fuses:**

**F1:** 250mA/300V FAST fuse, Ø5X20mm

**F2:** 10A/300V FAST fuse, Ø5X20mm

## ACCESSORIES

Battery: 1 pc, 6F22/9V

Test Lead: 1 pair

## NOTE

1. This manual is subject to change without notice.
2. Our company will not take the other responsibilities for any loss.
3. The contents of this manual can not be used as the reason to use the meter for any special application.



## DISPOSAL OF THIS ARTICLE

Dear Customer,

If you at some point intend to dispose of this article, then please keep in mind that many of its components consist of valuable materials, which can be recycled.

Please do not discharge it in the garbage bin, but check with your local council for recycling facilities in your area.





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CO.,LIMITED**

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